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ON

COOPERATIVE FISHERY RESEARCH

BEFORE THE
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Thank you, Mr. Chairman, for your invitation to provide testimony regarding a recently-completed initiative that brought users of the nation's fishery resources into the process of developing and carrying out cooperative research. My name is Anne Richards, and I am a research fishery biologist with the Population Dynamics Branch of NOAA Fisheries' Northeast Fisheries Science Center, in Woods Hole, Massachusetts. I will report on a comprehensive survey for monkfish that was conducted in cooperation with members of the monkfish industry and in collaboration with state resource agencies and universities.

Monkfish is currently the single most valuable wild-caught finfish in the northeast region of the United States. Monkfish landings were relatively low until the late 1980s, when they began to increase, reaching levels of 23,000 to 28,000 mt during the mid-1990s (Exhibit 1). A Monkfish Fishery Management Plan was prepared jointly by the Mid-Atlantic and New England Fishery Management Councils, and implemented in November 1999.

The cooperative monkfish research project grew out of fishing industry concerns that the available scientific information was not sufficient to evaluate whether monkfish stocks were overfished or depleted. While monkfish are captured in standard Northeast Fisheries Science Center bottom trawl surveys, the gear is not designed for them, and their catch rates are relatively low. Members of the monkfish industry were eager to contribute to the scientific process, and scientists at the Northeast Fisheries Science Center (NEFSC) recognized that an industry-based survey could provide an excellent opportunity to obtain a wealth of information on the biology and population status of monkfish. This led NEFSC scientists and a coalition of industry members to combine forces to design and conduct a collaborative monkfish resource survey.

The primary goals of the cooperative research program for monkfish were (1) to conduct a bottom trawl survey to characterize the size, age, and gender composition of monkfish in U.S. waters of the northwest Atlantic Ocean, (2) to estimate the relative density and absolute biomass of monkfish in the region, (3) to obtain improved population dynamics data for use in monkfish stock assessments, and (4) to provide a new basis for interpreting NEFSC survey results for monkfish.

The survey was jointly designed by scientists and industry. The NEFSC prepared a choice of scientifically valid survey designs, and members of the monkfish industry selected the design to use as a basis for the survey. Industry representatives then added a substantial number of sampling locations to those that were determined by the sampling design (Exhibit 2). Two commercial monkfish trawlers were chartered to conduct the survey, the F/V *Mary K* out of New Bedford, Massachusetts and the F/V *Drake* out of Portland, Maine (Exhibit 3). The vessels supplied the crew for the ships' operations and the scientific crew came primarily from the

NEFSC, the Massachusetts Division of Marine Fisheries, and from Rutgers University. A pilot survey was conducted in October 2000 to test methods and the full survey was conducted during February-April 2001.

Such a project presents a number of challenges, many of which were addressed with additional cooperative research and through the use of innovative technology during the survey. For example, fishing vessels vary in their capture efficiency owing to such factors as vessel and net design, the type of electronic equipment used, and methods for the actual fishing operations. Thus, monkfish catch rates for each vessel used in the cooperative survey needed to be interpreted in light of comparisons between the vessels and between the different nets used by one of the vessels. A series of research tows was undertaken during April and May 2001 to address these issues. These "ground-truthing" tows included side-by-side fishing comparisons between vessels and nets, tows used to measure the size of the net openings as they fished, underwater videos of the capture process, and experiments to estimate the absolute efficiency of the nets. The methods used to estimate efficiency were similar to the depletion experiment method that Dr. Sissenwine described for surfclams and sea scallops in his testimony. Electronic sensors were attached to the nets on all the survey tows to determine the exact amount of time the net was in contact with the sea bed and the precise position of the ship every second during each tow. These sensor data, along with the net measurements, allowed us to estimate the amount of sea floor swept by each survey tow. Additional sensor data provided continuous temperature records along the tow path.

More than 9,000 monkfish, weighing more than 16.5 metric tons, were captured in the 284 tows successfully completed during the cooperative survey. The length of every monkfish

was measured, and for more than 2,000 of them, samples were taken to determine age, sex, maturity, stage of gonadal maturation, and stomach contents. The monkfish ranged in size from 13 cm to 110 cm and in age from 2 to 10 years. The results of the survey indicate that the monkfish population consists of between 66,400 and 90,900 fish, with a total biomass of between 97,600 and 134,900 metric tons (Exhibit 4). Important biological findings included: (1) growth and maturation rates differ very little across the entire range sampled, (2) few males older than age 7 were present, while females up to 10 years old were found, (3) growth rates are rapid and weight gain increases rapidly in older fish, (4) cannibalism occurs, but at very low frequency, (5) blackfin monkfish (a highly similar species) rarely occurred in the catches.

The results of the survey were used to develop a much more comprehensive population assessment for monkfish than had previously been possible. This assessment was reviewed at the NEFSC's 34th Stock Assessment Review Committee meeting during November 26-30, 2001. The results of the assessment indicated that although fishing mortality is greater than the suggested Fmax, mortality rates are not dramatically higher than levels that would maximize yield (Exhibit 5). The analyses stemming from the cooperative survey provide new options for fishery managers in developing improved biological reference points for the monkfish Fishery Management Plan, and suggest avenues for improving the performance of the fishery.

An important additional benefit of the cooperative survey was the opportunity to compare results obtained from commercial fishery vessels with results from NEFSC fishery-independent trawl surveys. The comparisons both validated NEFSC survey data and suggested directions for improving NEFSC surveys for application to monkfish. For example, the size composition of monkfish in the southern management region as estimated from the NEFSC winter bottom trawl

survey is nearly identical to that estimated from the cooperative survey (Exhibit 6), and mortality rates estimated from the cooperative survey and from NEFSC survey age data were similar. The comparisons allowed us to estimate the relative efficiency of the NEFSC winter survey net with the commercial net, which will be invaluable in future calculations of population size and biomass.

A less tangible, but extremely important benefit of the cooperative survey was the opportunity to work directly with fishermen and to build a mutual trust and respect. We were able to see first-hand how they operate, listen to their observations on the fish and fishery, and discuss our sometimes differing viewpoints. In turn, the fishermen would be able to observe how we operate and to see that NOAA scientists are making diligent efforts to manage the fisheries so important to them.

An important tool for communicating with industry members not directly involved in the survey was a web site we established: (http://www.nefsc.nmfs.gov/nefsc/READ/popdy/monkfish/). Daily e-mail updates from each of the vessels were posted on the site along with ships' cruise tracks and current positions from NMFS' vessel monitoring system. The web site was followed closely by industry members, and many e-mailed follow-up questions and comments to us.

In summary, we feel the cooperative monkfish survey was very successful. It greatly improved our scientific understanding of monkfish, enhanced our ability to draw inferences about monkfish from ongoing NEFSC resource surveys, and opened valuable lines of communication among scientists and fishermen (Exhibit 7).

Mr. Chairman, this concludes my testimony. I would be happy to respond to any questions you or other members of the Subcommittee might have.